Hepatitis C Continuum of Care
Among Four Screening Populations in Durham County, North Carolina

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Senior Honors Thesis
Health Policy and Management
The University of North Carolina at Chapel Hill

May 2, 2019

Approved: April 10, 2019

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Introduction

Hepatitis C (HCV) is the most common blood-borne viral infection in the United States.[1] In 2010, the CDC estimates there were 3.5 million people in the US living with chronic HCV, and new cases of acute HCV have tripled from 2010 to 2015.[2]

The burden of HCV is high among vulnerable populations, such as racial minorities, people who inject drugs (PWID), and incarcerated persons.[3,4] Among persons born between 1945 and 1965 (the "birth cohort), which accounts for 74% of all chronic HCV cases, non-Hispanic blacks, and income below the poverty line have been shown to be significant predictors of chronic HCV infection.[5] In a study of PWID in Baltimore, non-Hispanic black individuals were found to be at higher risk for HCV infection.[6] HCV infection is also extremely prevalent in incarcerated populations. One study estimated that between 29% and 43% of those infected with HCV during that year passed through a correctional facility.[7] Another study examining male inmates in Rhode Island prisons estimated a prevalence of 23.1% among those incarcerated 12 months or more.[8] Yet, many individuals with HCV are either not diagnosed or unaware of their infection not aware of being infected.[9] Persons who are younger, uninsured, never been tested for HIV, or who use drugs but who are not engaged in substance use disorder treatment are less likely to be diagnosed.[9,10]

The continuum of care is a model that has been proposed to conceptualize progress through the milestones of HCV care, from screening and diagnosis to sustained viral response at 12 weeks (SVR-12, or functional cure).[11] Therapies for HCV have become increasingly safe and effective with the introduction of direct-acting antivirals (DAAs),[12,13] which have been shown to help patients achieve SVR in over 90% of cases with treatment courses as short as 8 weeks.[14] However, progression through the continuum remains poor. Although screening for HCV, as recommended

by the CDC and the US Preventive Services Task Force,[15,16] is becoming more common, there remains a large gap between a positive screening result and beginning treatment.[17] One study of persons living with HCV in Long Island, New York noted that of 155 HCV-positive individuals, only 110 (71%) had a follow-up HCV RNA test, and only 54 (35%) were successfully linked to care.[11] In one nationally representative systematic review, it was estimated that only 9% of persons with chronic HCV in the US had progressed through the continuum of care to achieve SVR.[18]

The continuum may be worse for vulnerable populations. One study found that of 187 Chronic HCV-infected patients meeting inclusion criteria, only 107 (57%) completed treatment.[19] In this study population, across univariate and multivariate analyses, patients with Medicaid insurance were less likely to complete an evaluation and less likely to be approved for treatment, pointing to a need for improved targeted interventions to close these and other gaps. A nationally representative 2016 study by Bourgi et al. confirmed that Medicaid beneficiaries who screened positive for HCV had significantly lower odds of treatment.[20]

Problem Statement

The continuum model presents an opportunity to examine how patients in diverse settings progress through the HCV treatment milestones, and can help identify opportunities for intervention to ensure patients achieve SVR.

Research Questions

This study examines outcomes for populations screened for HCV in four different care settings: a county jail, a local Federally Qualified Health Center (FQHC), the county health department, and its various non-jail outreach programs. The study was designed to address the following questions:

- What are the differences in demographics and risk factors between screening settings?

- Where do drop-offs occur in the continuums, and how do these differ between screening settings?
- What are factors associated with patients being prescribed treatment?

Methods

Study Design

We conducted a retrospective cohort study of patients enrolled in a pilot program implemented by the Durham County Health Department (DCHD) to enhance linkage to care for Hepatitis C virus infection (HCV). The pilot program utilized bridge counselor services to screen at-risk patients for HCV, provide pre- and post-test counseling, and link HCV-infected patients to care through partnerships with treating providers in and around Durham County. Data for patients in that process was routinely abstracted for program monitoring purposes. While the DCHD linkage-to-care program only extends to linking patients to their first appointment, patients were monitored through their HCV care through the end of treatment via collaboration and data-sharing with partner sites.

Settings and Populations

The program conducted HCV testing in four sites: the sexual health clinic of the DCHD, the Durham County jail, the Lincoln Community Health Center (an FQHC in Durham County), and a community outreach screening program which operated at several sites, including a residential substance abuse recovery program. These care settings serve populations who may be distinct in demographics, HCV risk factors and clinical comorbidities. Therefore, we chose to investigate differences in the data between these care settings.

Program Testing and Linkage to Care Process

Program HCV Testing Process: HCV screening was offered based on AASLD-IDSA HCV guidelines,[11] evaluating such risk factors as: history of injection drug use, HIV infection,

birth between 1945 – 1965 ("birth cohort"), history of incarceration, long-term sexual exposure to an HCV-infected person, history of multiple sexual partners, or male-to-male sexual contact. The Durham County jail offered opt-out HCV testing to all inmates; two health educators each visited the jail at least two times per week, and conducted testing in different pods. Other locations selectively screened based on aforementioned risk-factors.

Risk factors were assessed at the DCHD and through their non-jail outreach programs using a standardized self-report form. At Lincoln, risk factors were assessed using a similar form, also based on accepted evidence-based HCV guidelines. The Durham County Jail collected risk factor data but offered HCV testing to all inmates on an opt-out basis.

Testing was typically conducted on-site via existing phlebotomy services, or in a mobile testing unit. HCV antibody testing was conducted in all settings with automatic reflex to HCV RNA testing upon positive results.

Linkage-to-Care Intervention: The program's linkage-to-care intervention aimed to ensure persons had a first visit with an HCV-treating provider. There was approximately 6-8 weeks from the initial screening to the first appointment. A bridge counselor assisted with post-test counseling and met with patients (in-person at the DCHD, at home visits, or via telephone) to assist in scheduling appointments, address transportation barriers and send appointment reminders. Bridge counseling services concluded once a patient attended their first appointment with a treating provider.

Hepatitis C Continuum of Care

We constructed multiple continuums of care to analyze patient progression through milestones reflecting progression through HCV screening and treatment. Steps in the continuum include: (1) Diagnosis of HCV (2) Of those diagnosed with HCV, receipt of test results and post-

test counseling, (3) of those notified and counseled, referral to HCV care, (4) of those referred to care, attendance at first appointment with a treating provider ("linkage"), (5) of those linked to care, prescription of antiviral to treat HCV, (6) of those prescribed HCV treatment, receipt and start of antivirals, (7) of those starting antivirals, completion of medication course and, (8) of those completing medication, confirmation of undetectable HCV RNA level at least twelve weeks later (sustained viral response, SVR-12).[21] From initial screening to achieving SVR-12, the entire process lasts approximately nine to twelve months. Therefore, we selected patients who began the process prior to October 31, 2017 (twelve months before the most recent data), to ensure they had sufficient time to move through the full continuum of care.

Data Analysis

Continuum Analysis: An overall continuum of all patients was constructed. We assessed the total number of patients meeting each milestone, as well as the proportion of HCV-infected patients. The continuum was also stratified by the setting in which a patient was screened for HCV. We then compared each milestone between settings to determine if specific settings of diagnosis were associated with drop-off from the continuum. We employed an ANOVA test to compare differences in patient drop-off between settings.

Logistic Regression: We then constructed a multivariable logistic regression model, evaluating the effect of screening location on successful receipt of prescription. We adjusted for age, sex, race/ethnicity, insurance status and patient HCV risk factor(s). Statistical significance was defined as a p-value of <0.05. For the 37 patients who were screened in the jail and referred to a prison clinic we were unable to obtain data on whether or not they were prescribed treatment, and thus these patients were considered lost to follow-up. Therefore, we were forced to censor all patients linked to a prison clinic from our analysis.

Results

Demographics

Overall, 573 persons received a positive HCV antibody screening test with a subsequent confirmatory positive HCV RNA. The largest proportion of persons (46%) were diagnosed at the FQHC. Patients had a mean age of 47 (SD 13), were primarily black (65%) male (73%) residents of the city of Durham (84%) who were either uninsured (54%) or insured by Medicaid (21%) (Table 1). Persons diagnosed in the jail were younger (mean age 38, SD 12) and more commonly Non-Hispanic White (60%), compared with other sites. Race/ethnicity data was missing on 71% of FQHC patients, as this data is not routinely collected at the site.

The majority of patients (61%) were linked to a primary care provider (PCP) treating HCV, while others were linked to either a specialty clinic (39%) or a prison clinic (10%). Linkage to a PCP was most common for individuals screened in the county health department (64%) and at the FQHC (73%), while the most common referral for those screened through non-jail outreach was a specialty clinic (54%). The proportion of persons linked to care was lowest among those diagnosed at the jail (61%).

Information on HCV risk factors were available for a majority of patients; 73% reported a history of injection drug use and 45% had used non-injected drugs. Among all patients diagnosed, 3% were coinfected with HIV, 22% reported tattoos or piercings, and 40% had a history of incarceration. Other risk factors among all patients diagnosed include male-to-male sexual contact (MSM) (8%), sexually transmitted infection (6%), engaging in sex with a person who inject drugs (13%), sex with a person with HCV (11%), sex with multiple partners (11%), and exchanging sex for drugs or money (6%). Nearly half of all patients (48%) were members of the birth cohort, born

between 1945 and 1965. Prevalence of birth cohort members was lowest in the jail (19%) and highest in the FQHC (66%).

Continua of Care

In the overall continuum, 89% (449 patients) of those with chronic HCV were counseled on their diagnosis (Figure 1). 65% of all diagnosed (329 patients) were linked to care with an HCV-treating provider, representing a drop-off of 24% between counseling and linkage to care (Figure 3). Of eligible patients, 41% (192 patients) were prescribed treatment, representing a patient drop-off of 24% between linkage to care and prescription of treatment. Subsequently, 38% of patients (176) began treatment, and 34% (160) completed therapy. Of all eligible patients with chronic HCV, 24% (111) successfully achieved SVR-12.

For those diagnosed at the FQHC, the most substantial drop-off occurred from the proportion of eligible patients linked to care (83%) to those who were prescribed medication (59%) (Figure 2). For the county health department, the most prominent gap was between the same two milestones, decreasing from 74% of patients linked to care to 49% who were prescribed medication.

For non-jail outreach, there was a 35% drop-off from counseling to linkage to care (86% counseled and 51% linked to care). For those diagnosed at the jail, under half of those who were counseled on their diagnoses (85% of all persons diagnosed) were linked to care (42%). Among the 122 persons diagnosed in jail and not linked at a prison clinic, where subsequent treatment information was not available, 10 patients (8%) were prescribed medication.

Logistic Regression

In univariate analyses, screening site was significantly associated with patient receipt of HCV prescription; patients diagnosed at the county jail (OR: 0.07, 95%CI: 0.04, 0.15) and those

diagnosed through non-jail outreach (OR: 0.42, 95%CI: 0.24, 0.74) had significantly lower odds of being prescribed HCV treatment compared to the FQHC, while there was no significant difference between the county health department and the FQHC. Age was significantly associated with patient receipt of HCV prescription; a one-year increase in age was associated with 5% greater odds of being prescribed HCV treatment. In the unadjusted model, race was also found to be a determinant of treatment, with non-Hispanic blacks (OR: 10.87, 95%CI: 4.55, 25.99), individuals of Hispanic ethnicity or other nonwhite race (OR: 6.06, 95%CI: 1.58, 23.23), and individuals of unknown race (OR: 11.09, 95%CI: 4.64, 26.51) more likely to be prescribed HCV treatment compared to non-Hispanic whites. Other significant mediating factors of receiving a prescription were residence within the city of Durham (OR: 2.21, 95%CI: 1.27, 3.84), being a member of the birth cohort (OR: 2.81, 95%CI: 1.96, 4.04), and being linked to a specialty clinic as opposed to a primary care provider (OR: 3.63, 95%CI: 2.07, 6.38).

After adjusting for sociodemographic and risk factors, variables significantly associated with prescription of HCV treatment were diagnosis through non-jail outreach (OR: 0.33, 95%CI: 0.12, 0.89) as well as linkage to a specialty clinic (OR: 3.82, 95%CI: 1.95, 7.46). The Odds Ratio for the patients diagnosed in jail became nonsignificant in our adjusted model.

Discussion

In this study spanning a large urban county, we observed that 24% of persons diagnosed with HCV in four safety-net settings achieve SVR-12. The site of screening significantly predicted being prescribed medications for HCV treatment. After controlling for demographics and risk factors, persons linked to care at a specialty clinic had greater odds of being prescribed HCV treatment. Notably, insurance status did not impact the odds of receiving HCV treatment.

There is extensive literature examining HCV screening in different of settings. However, there is little data on how these screening sites compare to one another within the same community, resulting in inadequate knowledge of where interventions should be targeted in a given region.

We found that less than two-thirds of persons diagnosed with HCV (65%) were linked to care with an HCV-treating provider. Our experience in Durham County is consistent with reports from other sites and is not limited to the Southeastern US. In a comparable community outreach screening program conducted in New Haven, CT, 63% of individuals receiving a positive HCV screen were successfully linked to care, compared to 51% of individuals in our study.[22] A community outreach screening program in Philadelphia, which also included on-site phlebotomy testing and immediate automatic reflex to RNA testing, linked 64% of their patients to care.[23] Another study conducted in Philadelphia examined HCV screening conducted in five FQHCs, and found similar rates of success in linkage to care; across all five FQHCs, 78% of individuals with a current HCV infection were linked to care, which is generally similar to the 83% linkage rate observed in the FQHC in our study.[24] However, individuals in that report were all linked to HCV-specialty clinics, while individuals screened at Lincoln were variably linked to either a Primary Care Provider (PCP) or a Specialty Clinic. Our study found that receipt of a prescription for HCV treatment significantly predicted by whether patients were linked to care at a specialty clinic compared to a primary care clinic or prison clinic. Understanding the barriers to prescription of HCV treatment in primary care settings may help spur improvements along the latter steps of the cascade.

The Durham County Health Department is unique in providing surveillance for chronic HCV, offering on-site HCV antibody testing with reflex to RNA testing, and utilizing an in-house bridge counselor to facilitate linkage to care.[21,22,25,26] Persons diagnosed through the county health

department were only slightly less frequently linked to care than those diagnosed at the FQHC site (74% of patients to linked, compared with 83%). This success carried over to ensuring patients were actually prescribed treatment: 49%, compared with the FQHC's 59%. Bridge counseling services can be an important tool in helping individuals navigate the milestones of HCV care, especially in the setting of otherwise limited access to care, noninsurance or low health literacy.

Our study focused on the proportion of persons living with HCV who are prescribed treatment. Many evaluations of linkage-to-care programs cease to follow patients at the point of linkage to care.[27] For example, in one study of a community-based linkage to care model, of 512 patients with a current HCV infection, 435 (85%) were linked to care. The study concluded that its community-based model successfully had linked a large proportion of persons living with HCV to care; however, the study noted that only 14 of these patients actually initiated treatment, and of those, only 6 achieved functional cure. Given that a small proportion (2.7%) actually received care, and an even smaller proportion (1.2%) actually achieved functional cure, one may argue whether linkage to care is an adequate surrogate outcome for meaningful HCV care[8,28,29] Our study also found a substantial drop-off the cascade after linkage to care. Providing resources to safety-net settings to enhance patient navigation services in the latter steps of the cascade would likely improve community-level SVR-12 rates and thereby improve population-level clinical outcomes and decrease ongoing transmission.

Jails are a setting with significant opportunity for improvement in HCV screening and treatment. The prevalence of HCV in jails is higher than in the population at large, though it is lower than the prevalence within the prison population.[30] Despite high prevalence, jails typically struggle with linking patients with post-release HCV care.[31] This is compounded by societal factors that impede access to housing and employment for individuals post-release.[32] Programs

targeted towards post-release individuals show promise in linking these individuals to care, but large gaps remain; in a linkage-to-care intervention implemented in a North Carolina jail, just 18 of 66 individuals with a current HCV infection were referred to medical care, and of these, only 10 attended their first medical appointment.[33] Our intervention saw a higher proportion of individuals linked to care (42% vs. 27%), but only 10% were confirmed to have been prescribed treatment, suggesting that substantial improvements in care are needed further down the cascade.

Importantly, our study found that insurance status was not a significant predictor of being prescribed HCV treatment. This contradicts a nationally representative study of nearly 30,000 persons living with chronic HCV conducted by Wong et al. in 2018, which found that Medicaid beneficiaries and uninsured individuals had significantly lower odds of receiving treatment compared to individuals with private insurance (ORs 0.21 and 0.19, respectively).[34] We hypothesize that the lack of a significant difference in our study may be attributable to the success of the bridge counselor intervention in linking Medicaid beneficiaries and uninsured individuals to care. Additionally, we suspect that treatment over this study period was facilitated by the loosening of restrictions for treatment paid by Medicaid and expansion of Prescription Drug Assistance Programs by pharmaceutical companies for uninsured patients.

Application to Future Public Health Interventions

In our study, 44% of individuals screened in the Durham County jail dropped-off the cascade between the bridge counseling appointment and linkage to care. This finding suggests two possible opportunities for intervention. First, initiation of HCV therapy in the jail at the time of diagnosis may help streamline care and ensure patients take this critical step in HCV treatment. Second, persons released from jail may benefit from enhanced bridge counseling and navigation services to ensure they are linked to medical providers in the community. Qualitative analyses

examining the experiences of persons accessing HCV care following jail release will be an important first step in identifying challenges and designing interventions.

Understanding and overcoming barriers to antiviral prescription in primary care settings is also a critical step in improving community-wide outcomes. In our regression model, we found that linkage to a specialty clinic was the strongest predictor of being prescribed treatment (Adjusted Odds Ratio: 3.82, 95% CI: 1.95, 7.46). Given the burden of chronic HCV nationwide, streamlining referral pathways to specialty providers is unlikely to represent a sustainable and generalizable solution. Rather, educational initiatives in HCV care should target primary care clinicians, while primary care practices should develop pathways for integrating HCV treatment into routine practice. One initiative implemented by the University of New Mexico, the Extension for Community Healthcare Outcomes (ECHO) model, aimed to train PCPs in HCV management. A program evaluation found that prior to this training, 93% of enrolled clinicians had no prior experience in the care and treatment of HCV.[35] Similarly, a study of primary care settings in Baltimore found that only 10% of PCPs enrolled in the study had treated 1 or more HCV patient in the past year. Nonetheless, shifting HCV treatment to a primary care setting appears feasible and even ideal, given that HCV therapy can be provided over the course of only several visits, requires minimal lab monitoring and typically utilizes medications with few potential side effects. North Carolina, in partnership with two academic medical centers, has developed the Carolina Hepatitis Academic Mentorship Program (CHAMP) which conducts trainings and mentorship to equip the primary care workforce statewide with the tools and experience to treat HCV.[36] Enhancing the reach of these programs, combined with expanded patient navigation services, may be the most promising initial steps to addressing HCV in underserved populations.

Strengths and Limitations

Strengths of this study include the comparison of progression through the HCV continuum of care across four different screening settings which serve demographically unique, largely uninsured patient populations across a single large and diverse county. While there is a significant body of literature examining the HCV continuum of care in a variety of treatment settings, there is a dearth of studies comparing HCV continuums based on the setting in which patients are initially diagnosed, prior to linkage to care.

Although our findings on one county may limit generalizability, the focus on one urban county in the Southeastern US highlights the state of HCV care in one of the most HCV-prevalent regions in the US.[35] North Carolina is also in the minority of states who have not expanded Medicaid under the Affordable Care Act, and as such there may be a greater number of uninsured individuals in our study than similar studies in Medicaid expansion states, which may limit comparisons of our data. Additionally, our study collected data on the last four steps of the continuum from chart review, which lacks information on patient comorbidities, preferences and medical decision-making. Data on HCV treatment of persons in prison was missing in our study, limiting interpretation of the latter steps of the cascade for persons diagnosed in jail. Finally, the FQHC does not routinely collect data on race (71% missing), and for this reason a relatively large proportion (38%) of our data was missing this information, limiting our assessment of race as a mediating factor in receiving HCV treatment. Additionally, as mentioned in the Methods section, the 37 patients who were screened in the jail and referred to a prison clinic were considered lost to follow-up, and were censored from further analysis.

Conclusions

In this large study of safety-net systems for HCV diagnosis and care, we observed that progression through the HCV continuum of care is associated with the location of diagnosis.

Individuals screened at the FQHC were most likely to be prescribed treatment and eventually achieve functional cure, while individuals screened in community outreach settings were the least likely. Prescription of HCV treatment was significantly more likely for individuals who were linked to specialty clinics than those linked to primary care, indicating an opportunity for improvement of HCV care delivery in primary care settings. Additional research is needed to better understand the specific barriers that limit progression through the steps of the cascade and to design novel interventions to help improve HCV outcomes for the whole community.

Acknowledgements

The author would like to extend his sincerest thanks to Dr. Asher Schranz, his primary reader, and Drs. Karl Umble and Arlene Seña, his secondary readers, for providing their experienced perspectives and invaluable support throughout this process. The author would also like to thank Ms. Candice Givens and Ms. Alison Hilton for their hard work, valuable perspectives, and unwavering commitment to ensuring the success of the DCHD bridge counselor intervention program.

Appendix

Table 1. Demographic and risk factor data, stratified by screening setting

Item	Notes	Overall	DCHD*	FQHC**	Jail	Outreach
N		573	77	261	167	72
Age	Mean (SD)	47.45 (13.31)	45.73 (13.64)	53.33 (10.80)	38.13 (11.65)	48.29 (12.78)
Demographic Factors	n (%)					
Gender						
	Male Sex	421 (73%)	51 (66%)	189 (72%)	138 (83%)	43 (63%)
	Female Sex	151 (26%)	26 (34%)	72 (26%)	28 (17%)	25 (37%)
	Transgender	1 (<1%)	0 (0%)	0 (0%)	1 (<1%)	0 (0%)
Durham City Res.						
	Durham Res.	464 (84%)				
	Non-Durham	86 (16%)				
	Freq. Missing	23				
Race/ Ethnicity						
	Non-Hispanic White	108 (30%)	1 (2%)	0 (0%)	101 (60%)	6 (10%)
	Non-Hispanic Black	229 (65%)	49 (96%)	69 (91%)	57 (34%)	54 (89%)
	Hispanic / Latino	11 (3%)	0 (0%)	4 (5%)	7 (4%)	0 (0%)
	Other/Unknown	7 (2%)	1 (2%)	3 (4%)	2 (1%)	1 (2%)
	Freq Missing	218	26	185	0	7
Insurance						
	Private	27 (5%)	5 (6%)	7 (3%)	12 (7%)	3 (4%)
	Medicare	38 (7%)	4 (5%)	16 (6%)	13 (8%)	5 (7%)
	Medicaid	120 (21%)	15 (19%)	57 (22%)	39 (23%)	9 (13%)
	Other/Unknown	79 (14%)	13 (17%)	36 (14%)	18 (11%)	12 (18%)
	None	309 (54%)	40 (52%)	145 (56%)	85 (51%)	39 (57%)
Linkage to Care Site						
	Primary Care	221 (61%)	35 (64%)	151 (73%)	19 (29%)	16 (46%)
	Specialty Clinic	104 (39%)	20 (36%)	56 (27%)	9 (14%)	19 (54%)
	Prison Clinic	37 (10%)	0 (0%)	0 (0%)	37 (57%)	0 (0%)
	Not Linked	211	22	54	102	33
HCV Risk Factors	n (%)					
Injection drug use						
	Yes	374 (73%)	43 (64%)	176 (76%)	104 (68%)	51 (81%)
	No	139 (27%)	24(36%)	55 (24%)	48 (32%)	12 (19%)
	Freq Missing	60	10	30	15	5
Non-injection drug use						
	Yes	232 (45%)	31 (46%)	109 (47%)	67 (44%)	25 (40%)
	No	282 (55%)	36 (54%)	123 (53%)	85 (56%)	38 (60%)
	Freq Missing	59	10	29	15	5
HIV+						
	Yes	13 (3%)	3 (4%)	7 (3%)	2 (1%)	1 (2%)
	No	500 (97%)	65 (96%)	226 (97%)	147 (99%)	62 (98%)
	Freq Missing	60	9	28	18	5
Tattoos or piercings						
	Yes	112 (22%)	18 (26%)	59 (25%)	24 (16%)	11 (18%)
	No	400 (78%)	50 (74%)	173 (75%)	127 (84%)	50 (82%)
	Freq Missing	61	9	29	16	7
H/o incarceration						
	Yes	213 (40%)	29 (41%)	117 (48%)	44 (28%)	23 (36%)
	No	318 (60%)	41 (59%)	125 (52%)	111 (72%)	41 (64%)

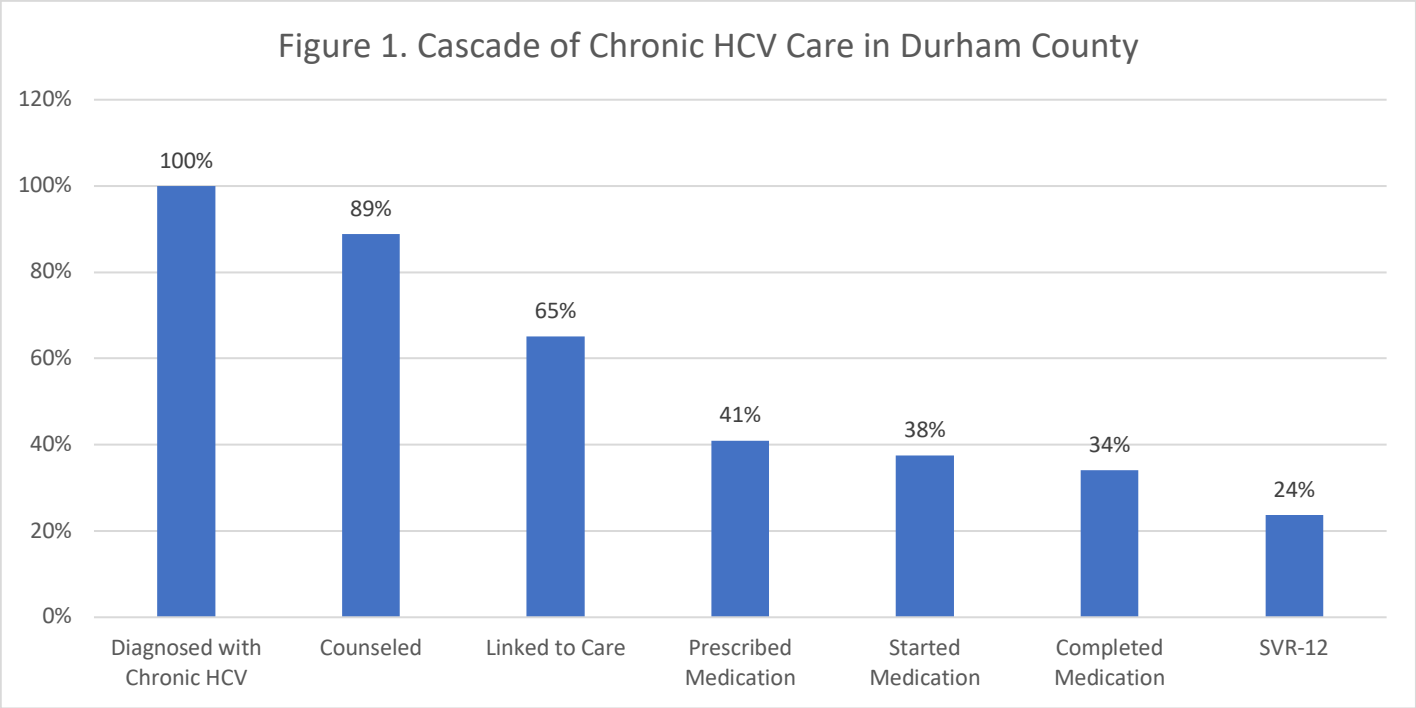
	Freq Missing	42	7	19	12	4
MSM						
	Yes	40 (8%)	10 (15%)	19 (8%)	10 (7%)	1 (2%)
	No	474 (92%)	58 (85%)	215 (92%)	139 (93%)	62 (98%)
	Freq Missing	59	9	27	18	5
STI+						
	Yes	30 (6%)	3 (4%)	14 (6%)	9 (6%)	4 (6%)
	No	482 (94%)	64 (96%)	218 (94%)	141 (94%)	59 (94%)
	Freq Missing	61	10	29	17	5
Sex with PWID						
	Yes	68 (13%)	6 (9%)	41 (18%)	13 (9%)	8 (13%)
	No	454 (89%)	60 (91%)	191 (82%)	137 (91%)	55 (87%)
	Freq Missing	62	11	29	17	5
Sex with HCV+ person						
	Yes	58 (11%)	15 (22%)	20 (9%)	18 (12%)	5 (8%)
	No	454 (89%)	52 (78%)	212 (91%)	132 (88%)	58 (92%)
	Freq Missing	61	10	29	17	5
Sex w multiple partners						
	Yes	55 (11%)	8 (12%)	31 (13%)	10 (7%)	6 (10%)
	No	449 (89%)	56 (88%)	199 (87%)	138 (93%)	56 (90%)
	Freq Missing	69	13	31	19	6
Sex for drugs/money						
	Yes	30 (6%)	5 (7%)	15 (6%)	7 (5%)	3 (5%)
	No	482 (94%)	62 (93%)	217 (94%)	143 (95%)	60 (95%)
	Freq Missing	61	10	29	17	5
BT before 1992						
	Yes	26 (5%)	7 (11%)	5 (2%)	10 (7%)	4 (6%)
	No	479 (95%)	57 (89%)	226 (98%)	138 (93%)	58 (94%)
	Freq Missing	68	13	30	19	6
Birth Cohort member						
	Yes	276 (48%)	33 (43%)	173 (66%)	32 (19%)	38 (56%)
	No	297 (52%)	44 (57%)	88 (34%)	135 (81%)	30 (44%)
	Freq Missing	0	0	0	0	0

*Durham County Health Department. **Federally Qualified Health Center (Lincoln).

Table 2. Univariate and Adjusted Odds Ratios of Receiving HCV Prescription

Variable	Category	Univariate OR (95%CI)	Adjusted OR (95% CI)
Screening Site			
	Lincoln FQHC	*ref*	
	DCHD	0.77 (0.46, 1.28)	0.61 (0.27, 1.37)
	DC Jail	**0.07 (0.04, 0.15)**	**0.29 (0.08, 1.07)**
	Non-Jail Outreach	**0.42 (0.24, 0.74)**	**0.33 (0.12, 0.89)**
Age	age	**1.05 (1.04, 1.07)**	1.00 (0.96, 1.04)
Sex			
	Female	*ref*	
	Male	0.77 (0.52, 1.13)	0.70 (0.38, 1.28)
Race/Ethnicity			
	Non-Hispanic White	*ref*	
	Non-Hispanic Black	**10.87 (4.55, 25.99)**	2.03 (0.43, 9.60)
	Hispanic/Other	**6.06 (1.58, 23.23)**	1.74 (0.18, 16.65)
	Unknown	**11.09 (4.64, 26.51)**	1.06 (0.21, 5.37)
Insurance Status			
	Private Insurance	*ref*	
	Medicare	1.43 (0.47, 4.31)	0.73 (0.14, 3.85)
	Medicaid	1.53 (0.59, 3.95)	0.76 (0.18, 3.24)

	Other or Unknown	2.57 (0.97, 6.79)	1.61 (0.33, 7.73)
	Uninsured	1.87 (0.77, 4.55)	1.23 (0.31, 4.95)
IDU			
	No	*ref*	
	Yes	1.34 (0.88, 2.05)	1.03 (0.54, 1.94)
HIV			
	No	*ref*	
	Yes	0.71 (0.22, 2.34)	0.49 (0.10, 2.44)
MSM			
	No	*ref*	
	Yes	0.68 (0.33, 1.41)	0.65 (0.23, 1.80)
Site of linkage to HCV Care			
	Primary Care	*ref*	
	Specialty	**3.63 (2.07, 6.38)**	**3.82 (1.95, 7.46)**
Residence			
	Outside Durham	*ref*	
	Within Durham	**2.21 (1.27, 3.84)**	1.31 (0.56, 3.04)
Birth Cohort	No	*ref*	
	Yes	**2.81 (1.96, 4.04)**	1.73 (0.69, 4.32)



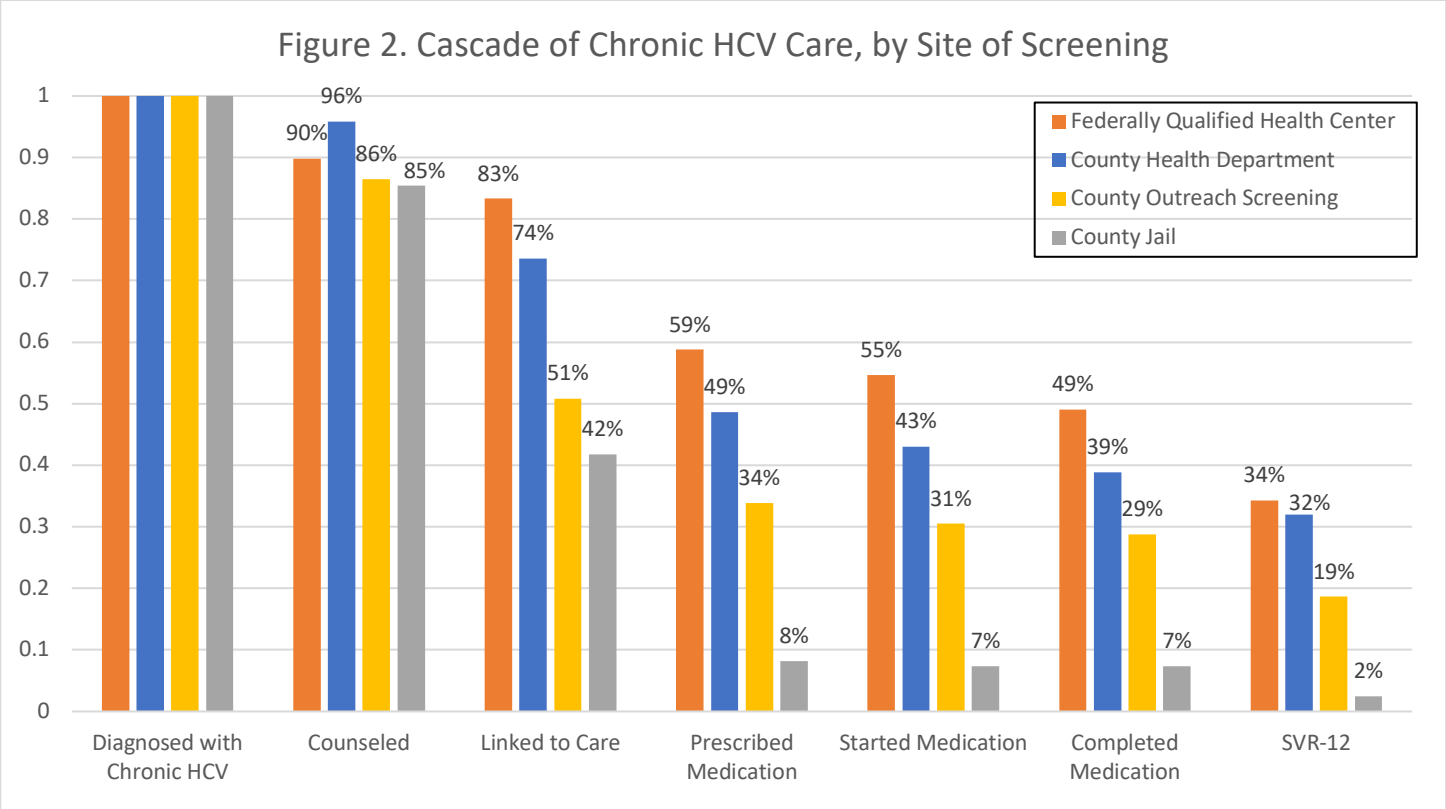


Figure 2. Cascade of Chronic HCV Care, by Site of Screening
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Federally Qualified Health Center
County Health Department
County Outreach Screening
County Jail
90%
96%
86%
85%
83%
74%
51%
42%
59%
49%
34%
8%
55%
43%
31%
7%
49%
39%
29%
7%
34%
32%
19%
2%
Diagnosed with Chronic HCV
Counseled
Linked to Care
Prescribed Medication
Started Medication
Completed Medication
SVR-12

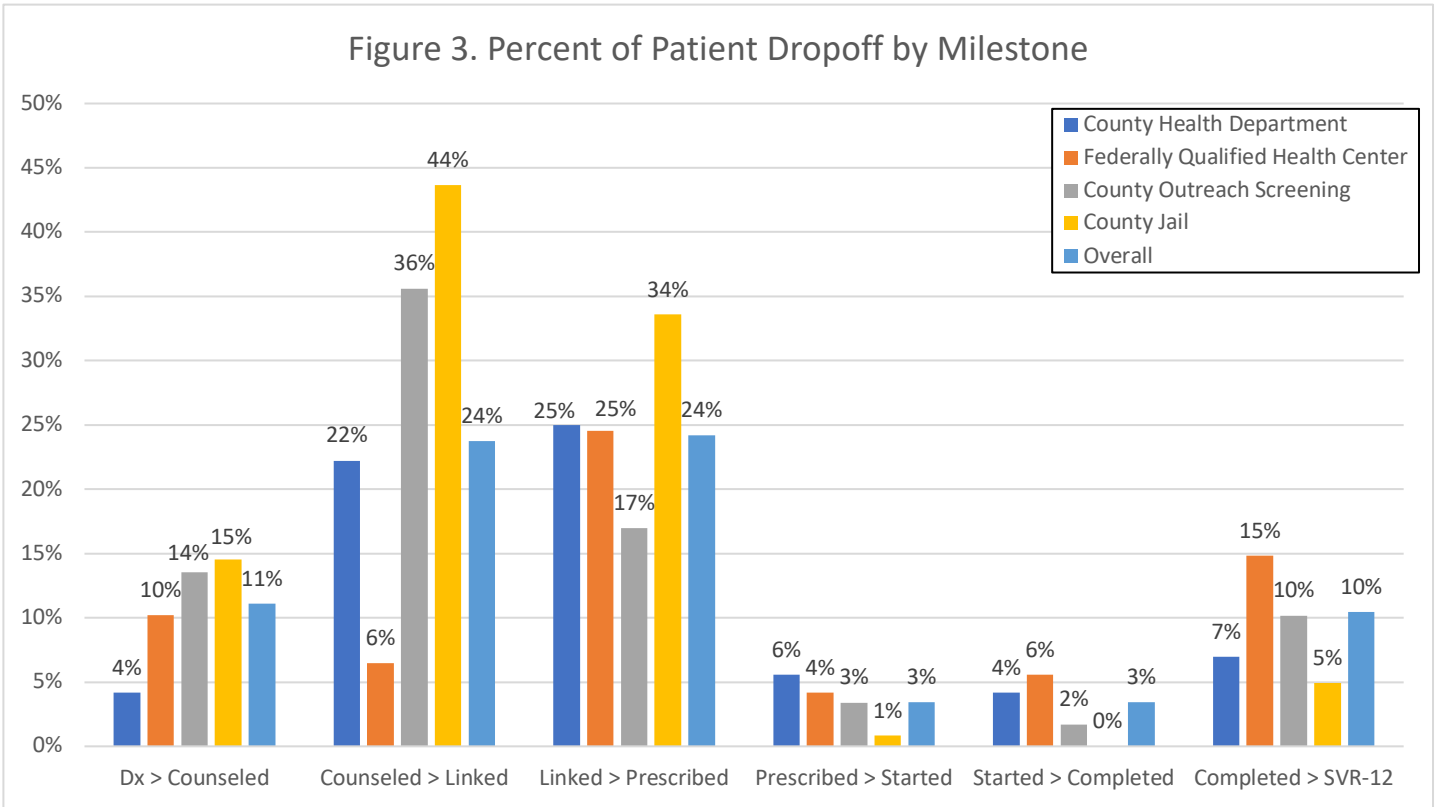


Figure 3. Percent of Patient Dropoff by Milestone
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
County Health Department
Federally Qualified Health Center
County Outreach Screening
County Jail
Overall
4%
10%
14%
15%
11%
22%
6%
36%
44%
24%
25%
25%
17%
34%
24%
6%
4%
3%
1%
3%
4%
6%
2%
0%
3%
7%
15%
10%
5%
10%
Dx > Counseled
Counseled > Linked
Linked > Prescribed
Prescribed > Started
Started > Completed
Completed > SVR-12

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